ART. I. NOTES ON AMPHIBIANS FROM ROCKINGHAM COUNTY, VIRGINIA

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Introduction

The junior author recently presented to the Carnegie Museum a few amphibians that he had collected while a student at Bridgewater College, Bridgewater, Rockingham County, Virginia. In view of the paucity of herpetological records for the Shenandoah Valley and because of the rarity of certain of the specimens, a brief report upon this collection seems desirable.

Thirteen species are represented by the eighteen specimens in the Carnegie Museum; three additional species are in the collection of Bridgewater College; and yet another three are mentioned in the field notes of the junior author. Thus, from Rockingham County, we list nineteen forms, and indicate the localities at which they have been found.

Dr. Harry G. M. Jopson of Bridgewater College and Dr. E. R. Dunn of Haverford College have manuscript records of three other species—*Desmognathus phoca*, *Hyla versicolor versicolor*, and *Rana catesbeiana*—from Rockingham County. The total of twenty-two forms at present known from this region could undoubtedly be increased by more extensive collecting. In Virginia, *Desmognathus ochrophaeus ochrophaeus* is known only from the east slope of the Allegheny Mountains in near-by Highland County (Netting, 1932), although it has been found in Pendleton County, West Virginia, which adjoins Rockingham County on the west. The other amphibians that may possibly occur in the county are: *Ambystoma jeffersonianum*, *Ambystoma opacum*, *Plethodon richmondi*, *Plethodon wehrlei*, *Hemidactylium scutatum*, *Aneides aeneus*, and *Pseudacris brachyphona*.

In an important study of the food habits of snakes of the George Washington National Forest, a portion of which is located in Rocking-

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ham County, Uhler, Cottam and Clarke (1939) mention twelve species of amphibians that were taken from snake stomachs. *Acris crepitans* is incorrectly listed as *Acris gryllus;* with this correction all the species referred to are represented in the Rockingham County fauna, as we now know it.

LIST OF SPECIES

Triturus viridescens viridescens Rafinesque

One adult male (CM 16971) was secured at Rawley Springs (George Washington National Forest, about eleven miles west of Harrisonburg) on October 9, 1937. The species also occurs one mile west of Bridgewater along the backwaters of the North River.

Ambystoma maculatum (Shaw)

The Spotted Salamander has been found only at Rawley Springs. One specimen was collected there in April, 1937, and three, on April 2, 1938. One of the latter, an adult female (CM 16872), measures 210 mm. in total length. Numerous egg masses were observed, and larvae were collected in both years.

Gyrinophilus porphyriticus porphyriticus (Green)

One adult (CM 16349) was taken at Rawley Springs on April 13, 1937. The species has been collected also at Bridgewater and Hone Quarry (George Washington National Forest, about fifteen miles west of Harrisonburg).

Pseudotriton ruber ruber (Sonnini)

Two adults (CM 16347-48) were collected at Rawley Springs on February 2, 1937.

Eurycea bislineata bislineata (Green)

One adult (CM 16972) was collected at Rawley Springs on October 9, 1937; others have been found at Hone Quarry.

Eurycea longicauda longicauda (Green)

One subadult (CM 16357) was secured at Bridgewater on April 10, 1938. The species occurs at Rawley Springs, also.

Plethodon cinereus (Green)

Two dark-backed adults (CM 16355-56) of this locally common salamander were collected at Bridgewater on February 2, 1938. It has also been found at Hone Quarry, Rawley Springs, Sparkling Springs, and Stokesville.

TABLE I

CM No.	Sex	Costal Grooves	Head-body Length	Tail Length	Tail as % of Head-body	Dorsum
16355	♀	20	48	49	102.0	dark; no stripe
16356	♀	19	36	30	83.3	dark; no stripe

Plethodon glutinosus (Green)

One specimen was found at Sparkling Springs (eight miles northwest of Harrisonburg) on November 14, 1937.

Desmognathus fuscus fuscus (Rafinesque)

Three adults (CM 16352-54) were taken at Bridgewater on February 13, 1937. This species is common in Rockingham County, and has been collected at Rawley Springs and Stokesville.

Scaphiopus holbrookii holbrookii (Harlan)

On April 27, 1937, a strange frog chorus, apparently consisting of dozens of voices, was heard in a wheat field at Bridgewater. The wheat was then several inches high, and heavy rains had flooded a low area to a depth of from five to six inches. Here about a dozen *Scaphiopus holbrookii holbrookii* were collected, and the mating behavior of others was observed. In several instances two males were seen clinging to one female. This observation is of interest, since in his excellent study of this species Ball fails to mention multiple clasping, and in fact specifically states: "Should another male approach, the one in amplexus croaks violently and thrusts the intruder away with a hind limb" (1936: 366). Oviposition occurred and eggs were seen attached to stubble. Calls were heard during seven or eight succeeding evenings.

The flooded area dried up in about sixteen days. Nineteen days is the shortest time reported (Ball, 1936: 355) between oviposition and protrusion of forelimbs in New England specimens, but in this more southern locality metamorphosis may have been accomplished more quickly. Unfortunately, no observations were made to prove that tadpoles were present at any time during the sixteen-day period. No Spadefoots were heard at this locality in 1938, but they were heard at the same site in May, 1939. The species has not been taken elsewhere in Rockingham County.

Two adults in the junior author's collection measure 65 and 58 mm. in head-body length. The single adult (CM 16871) in the Carnegie collection measures but 50 mm. This specimen has a broad, but not sharply demarcated, light mid-dorsal stripe, formed anteriorly by the junction, at a point between the parotoids, of two faint light stripes that extend backward from above the eyes. The stripe is widest at the mid-point of the back where it encloses a large, circular, dusky spot; it is bordered with dark brown which merges into the gray color of the sides. The light stripe is studded with numerous small black spines; there are few spines on the back, outside of the stripe, and on the sides, but in these regions numerous low warts are present. A fresh specimen (CM 17632) from Montgomery County displays similar coloration and distribution of spines and warts, although the latter are larger and more prominent. Two additional Montgomery County specimens (CM 17633-34) are almost uniform rusty brown, the usual color of specimens of *Scaphiopus* that have been stored in formalin for a few years. Prompt transfer to alcohol seems to be more necessary with *Scaphiopus* than with other eastern frogs if the specimens are to be used for the study of pattern variations.

For comparative purposes metric data upon all of the Virginia specimens of this species now in the Carnegie collection are presented in the following table:

TABLE II

CM No.	Sex	Head-body Length	Tibia Length	Interorbital Width	Tibia as % of Head-body	Interorbital as % of Head-body
17632	♂	66	23	8	34.8	12.0
17633	♂	61	21	7.5	34.4	12.3
17634	♂	61	22	8	36.0	13.1
16871	♀	50	16	6	32.0	12.0
13208	juv.	37	12.5	5	33.7	13.5
32091	juv.	36	12.5	4.5	34.7	12.5

The specimens listed above bear the following data:

13208-09 New Kent Co.: near Lanexa
May 27, 1938. Neil D. Richmond

16871 Rockingham Co.: Bridgewater 1200 ft.
April 27, 1937. L. Wayne Wilson

17632 Montgomery Co.: Radford 1800 ft.
August 6, 1939. N. B. Green and N. D. Richmond

17633-34 Montgomery Co.: Radford 1800 ft.
March 26, 1939. Paul R. Burch

In the above records only the Bridgewater station is new; it is the first Shenandoah Valley record for the Spadefoot, and the second Virginia record from west of the Blue Ridge. Dunn (1936:2) lists *S. h. holbrookii* as occurring in Essex, Accomac, and Montgomery counties; Richmond and Goin (1938: 302) have since reported it from New Kent County. Radford is only about one hundred and twenty miles southwest of Bridgewater, but it may have received its Spadefoot population from the east through the Roanoke Valley rather than from the northeast. The Blue Ridge east of Montgomery County is too poorly defined to act as an effective barrier to the westward movements of those eastern forms that are not restricted to the Coastal Plain. Valley-migrating forms may reach Roanoke by way of the Roanoke River without going above an altitude of 1000 feet; Roanoke is separated from the Shenandoah Valley by the 2000-foot Shenandoah-Roanoke divide. The Pedlar Hills intervene between Roanoke and Radford on the New River; this escarpment proved a barrier to human migration in colonial times (Fenneman, 1938:248-249) and may have affected other groups as well. The routes by which amphibians and reptiles reached the upper New River are especially worthy of study, for the New River gorge certainly seems impassable for certain kinds. Records of *Scaphiopus* within the Appalachian area are as yet too few to permit accurate appraisal of the distributional barriers that control this form, but apparently its principal migration lanes are along large and fairly mature river valleys.

Bufo americanus americanus (Holbrook)

One juvenile (CM 16358) was collected at Bridgewater on May 10, 1938.

Bufo woodhousii fowleri Hinckley

This species was taken at Bridgewater College, Bridgewater on April 10, 1938.

Acris crepitans Baird

Two adult females (CM 16350-51), measuring 20.5 mm. and 22 mm. in head-body length, were collected at Rawley Springs on March 22, 1938. The species has been seen also at Bridgewater and at Stokesville.

Dunn (1938:154) lists six criteria for use in distinguishing *crepitans* from *gryllus*. Four of these: (1) larger size, (2) more extensively webbed feet, (3) shorter legs, and (4) less definitely striped thighs, are evident in our specimens when they are compared with topotypes of *gryllus* from Riceboro, Georgia. The two other diagnostic characters used by Dunn do not hold in our specimens; they seem, therefore, to merit further discussion. First, he characterizes *gryllus* as "more rugose" than *crepitans;* the contrary is true in the Rockingham County specimens which are definitely more rugose than are *gryllus* topotypes. Wide variation in the amount of rugosity occurs in both species and we feel that this character is the least useful of those used by Dunn. Secondly, Dunn states that the anal warts of *gryllus* are less prominent than are those of *crepitans*. This statement is ambiguous because it fails to indicate whether the warts are prominent by reason of their color, size, or number. The startlingly white color of the subanal warts of some specimens of *Acris* is a result of preservation in formalin, as the senior author has determined experimentally; specimens preserved in alcohol show less color change and the subanal warts do not fade to an ivory white. It is quite evident, however, that rugosity of the central thigh area is more characteristic of *crepitans* than of *gryllus;* the Virginia specimens and many examples of *crepitans* from elsewhere exhibit a greater number of subanal warts than do topotypes of *gryllus*, but brilliant white warts are present in some specimens of each species. In addition to the characters mentioned by Dunn, *crepitans* has a shorter head and a more obtuse snout than *gryllus*.

Pseudacris nigrita feriarum (Baird)

About 7:30 P.M., on February 13, 1937, this frog was heard calling from among the long grasses in a marshy area bordering a small ditch

that parallels Long Glade Creek at Bridgewater. The calling individuals were scattered, and as the evening became cooler the calls diminished noticeably; but two specimens, a male and a female, were collected.

The female (CM 16870) has narrower and more broken dorsal stripes than do male topotypes from Pennsylvania. The dorsal surfaces of the hind legs are faintly barred. This is apparently the first record of this species in the Shenandoah Valley.

Hyla crucifer crucifer Wied

One adult male (C M 16359) was secured at Bridgewater on May 16, 1937.

Rana clamitans Latreille

The Bridgewater College collection contains specimens taken in the North River at Bridgewater on October 30, 1937.

Rana palustris Le Conte

The Bridgewater College collection contains specimens taken in the North River at Bridgewater on October 30, 1937.

Rana pipiens Schreber

The Bridgewater College collection contains specimens taken in the North River at Bridgewater on October 30, 1937.

Rana sylvatica sylvatica Le Conte

Egg masses of this species, and of *Ambystoma maculatum*, were abundant in several small pools above Rawley Springs on April 2, 1938.

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